State of Wyoming
Department of Health

The Burden of Cardiovascular Disease in Wyoming

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Cardiovascular disease (CVD), including coronary heart disease and stroke, is the number one cause of death in the state of Wyoming accounting for almost 33% of all deaths in 2000.

This rate is more than respiratory diseases, accidents, diabetes, influenza and pneumonia, Alzheimer's disease, suicide, and chronic liver disease combined. Unsurprisingly, the burden of cardiovascular disease on the state of Wyoming in terms of morbidity (illness), mortality (death), and economics is considerable. This report will examine the burden of cardiovascular disease on the state of Wyoming by utilizing data collected from a variety of sources including the 2000 United States Census, the 2001 Behavioral Risk Factor Surveillance Survey (BRFSS), and Discharge Data from Wyoming hospitals.

The age-adjusted mortality rate for heart disease for Wyoming in 2000 was 216.9/100,000, which is down from previous years (i.e., 1999 = 232.1). County data was examined over a 5-year span (1996-2000) and revealed, over this time period, Carbon County had the highest age-adjusted mortality rate at 361.78/100,000 for heart disease, while Teton County had the lowest rate at 189.14/100,000. The age-adjusted mortality rate for stroke in Wyoming in 2000 was 58.1/100,000, which is also down from previous years (i.e., 1999 = 61.5). The five-year age-adjusted mortality rate (1996-2000) for counties revealed that Teton County had the highest mortality rate due to stroke (98.96/100,000), while Carbon County had one of the lowest rates (30.94/100,000).

The burden of cardiovascular disease is not limited to morbidity and mortality. Between July 2000 and June 2001, a total of 18,783 people were discharged from Wyoming hospitals with either a primary or secondary diagnosis of cardiovascular disease at a cost of over $246 million. While CVD-related diagnoses accounted for only 35% of the total number of diagnoses, the cost of CVD and related diagnoses accounted for 54% of the total cost of all hospital discharges.

The major risk factors associated with CVD are also prevalent in Wyoming's population. According to the 2001 BRFSS, high blood pressure affects 22.4% of the population, 30.5% have high blood cholesterol, and 4.5% of Wyoming's adults have diabetes. Using the weight and height ratios in the Body Mass Index (BMI), 36% of Wyoming residents are overweight and nearly 20% are obese. Just over 21% of all adults in the state do not engage in any leisure time physical activity, and 22.2% are current smokers. Additionally, 16.7% of the state's residents claim they have no health care coverage.
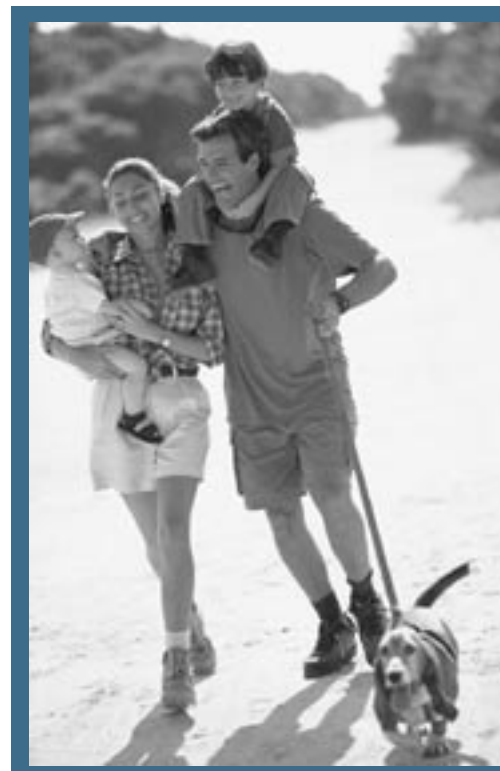
Regardless of these problems, a majority of both men and women think they are in good or excellent physical condition. Most know the major signs/symptoms of heart attack and stroke, and know to call 9-1-1 if they or someone they know has a heart attack or stroke. In addition, 60.4% of males and 70.5% of females are eating fewer high fat or high cholesterol foods in order to lower their risk of heart disease. Thirty-five percent of adults over the age of 35 take a daily aspirin; of those almost 80% take the aspirin to prevent heart attack and just over 67% take it to prevent stroke.

While some behaviors in Wyoming residents are encouraging, a good deal of work is needed to combat some of the major CVD risk factors including lack of physical activity, increased weight gain, and tobacco use.   It is hoped this report is the first step in establishing a more comprehensive program to decrease the prevalence and incidence of heart disease and stroke in Wyoming's population through education, interaction, and community interventions.

INTRODUCTION

According to the American Heart Association (AHA) and the Centers for Disease Control (CDC), cardiovascular disease affects some 61,800,000 Americans (1-2). This number is comprised of over 29 million men and over 32 million women.

Additionally, over 24 million people with cardiovascular disease are over the age of 65 [3] (see Figure 1). Essentially, 1 in every 5 people in the U.S. has some form of cardiovascular disease [3]. (Cardiovascular disease includes coronary heart disease, atherosclerosis, and stroke.)

FIGURE 1: **Prevalence of Cardiovascular Diseases in Americans** Age 20 and Older by Age and Sex - 1988 to 1994
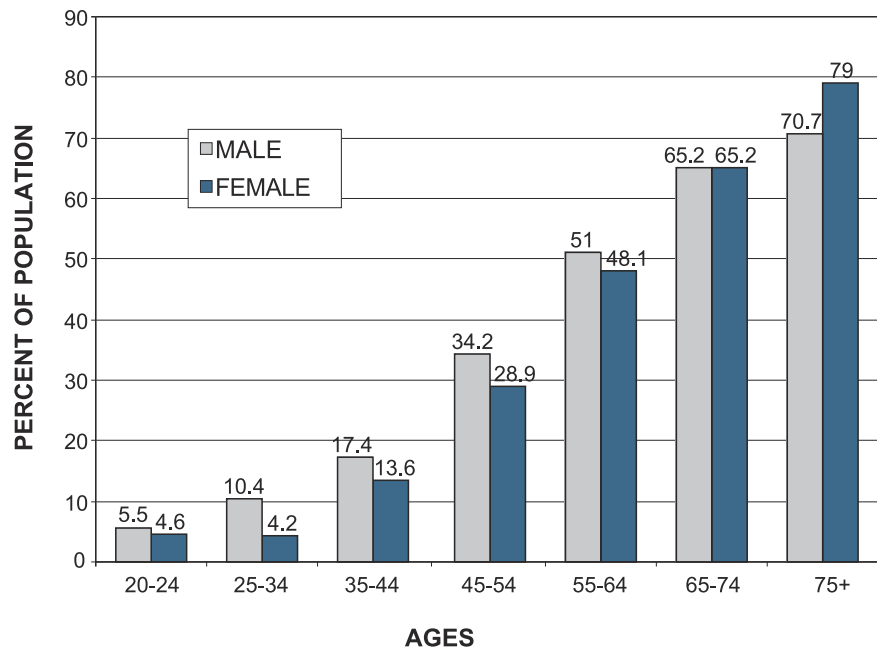
Source: AHA 2002 Heart and Stroke Statistical Update

What is Cardiovascular Disease?

Cardiovascular Disease

Cardiovascular disease (CVD), also known as Total CVD, refers to a wide spectrum of diseases that affect the heart, arteries, brain, and peripheral tissues [1,5]. Heart attack, stroke, angina, atherosclerosis, congestive heart failure, and congenital cardiovascular defects are a few of the conditions/diseases associated with CVD. The term "cardiovascular disease" encompasses all other heart related diseases, such as coronary heart disease, as well as cerebrovascular disease (i.e., stroke).

Coronary Heart Disease

Coronary heart disease (CHD) is caused by atherosclerosis, a condition associated with a build-up of plaque in the arteries of the heart. Plaque is a soft fat-like substance found in the blood that adheres to the walls of the arteries [6]. As blood passes through the arteries, more plaque is deposited along the walls until the artery begins to narrow. This, in turn, restricts the flow of blood through the artery, which results in angina (chest pain), blood clots, myocardial infarction (heart attack) and sudden death due to cardiac arrest. Risk factors for CHD include high cholesterol and triglyceride levels, high blood pressure, and smoking.

STROKE

Stroke, also known as a "brain attack," occurs when the blood flow to the brain is disrupted. There are two types of strokes: ischemic and hemorrhagic. Ischemic strokes occur when there is a blockage in the cerebral artery that supplies blood to the brain. This blockage most often occurs when a blood clot forms and blocks the blood flow in the cerebral artery. As with the arteries in the heart, plaque builds up in these arteries, narrowing them and increasing the risk for stroke. High cholesterol, which contributes to atherosclerosis, is a major risk factor in this type of stroke. Ischemic strokes account for 70-80% of all strokes [4,7].

In a hemorrhagic stroke, a blood vessel in the brain becomes weak and ruptures, spilling blood into the surrounding area of the brain. High blood pressure is a major risk factor for this type of stroke because it increases the pressure inside the blood vessels in the brain. Hemorrhagic strokes account for approximately 17% of all strokes [4,7].

Major Modifiable Risk Factors

HIGH BLOOD PRESSURE

High blood pressure is a major risk factor in all cardiovascular diseases. The heart works harder than it normally would, increasing the pressure on veins and arteries [6]. According to the AHA, high blood pressure increases the risk of heart attack, stroke, congestive heart failure, and atherosclerosis [6]. It is estimated that some 50 million Americans, age 6 and above, have high blood pressure [4] (see Table 1). Additionally, research has shown that males who have high blood pressure at an early age have significantly increased risk of cardiovascular disease [7] and stroke [9] later in life. While high blood pressure has no symptoms and people can go years without realizing they have this condition, it can be effectively regulated by diet, medication, and exercise. There are many medical and pharmacological options open to physicians and individuals to treat high blood pressure. Whelton, et al. (1998) found that reducing sodium intake and weight loss alone constituted an effective non-medicinal treatment for hypertension in people aged 60-80 [10].

TABLE 1: BLOOD PRESSURE LEVELS

Blood pressure (mm Hg)	Normal	Pre-Hypertension	Stage 1 Hypertension	Stage 2 Hypertension
Systolic (top number)	less than 120	120-139	140-159	160 and higher
Diastolic (bottom number)	less than 80	80-89	90-99	90 or higher

Source: National Heart, Lung, and Blood Institute
http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7card.htm

HIGH BLOOD CHOLESTEROL

There are two different kinds of cholesterol found in the human body: low-density lipoprotein (LDL) and high-density lipoprotein (HDL). Only about 15% of blood cholesterol comes from a person's diet, with the other 85% being made by the liver. LDL cholesterol is "bad" cholesterol because it is a component of the plaque that is deposited on artery walls [6]. On the other hand, HDL cholesterol is "good" cholesterol because it carries excess cholesterol back to the liver where it is removed from the blood. A high level of LDL or a low level of HDL blood cholesterol increases a person's risk of coronary heart disease and stroke. The AHA estimates that over 102 million American adults have a total cholesterol level over 200 mg/dL [3] (see Table 2). Additionally, high blood cholesterol in combination with other risk factors (e.g., smoking, high blood pressure) increases an individual's (male or female) risk of CHD, CVD, and all cause mortality [11]. Eating a diet low in fat and cholesterol, but high in Omega-3 fatty acids, can help reduce this risk (see Table 3).

TABLE 2: BLOOD CHOLESTEROL LEVELS

Blood Cholesterol (mg/dL)	Desirable	Borderline	Risky
Total Blood Cholesterol	less than 200	200-239	240 and over
LDL Cholesterol (Bad Cholesterol)	less than 100-129	130-159	160 and over
HDL Cholesterol (Good Cholesterol)	60 and over	40-59	less than 40
Triglyceride Level	less than 150	150-199	200 and over

Source: American Heart Association Website, http://www.americanheart.org/

TABLE 3: FOODS AND CHOLESTEROL

Foods and Cholesterol			
	GOOD	OKAY	AVOID
Grains	Whole grain breads, cereal, rice, pasta, pretzels, fig bars	Muffins, cornbread, cake donuts	Cheesecake, pies, buttered popcorn, chips
Dairy	Skim Milk, 1-2% cottage cheese, 1-2% cheese, nonfat yogurt	2% Milk, low-fat yogurt ice cream, reduced fat sour cream	Whole milk, ream, non-dairy coffee creamers
Meat	Fish, skinless poultry, water-packed tuna, "Select" or "Choice" grade meats, venison	Tuna in oil, oysters, lobster, shrimp, scallops, crab	"Prime" grade meat, spare ribs, sausage, bacon, fried meats, canned or potted meat
Fats	Olive oil, sesame oil, canola oil, corn oil, peanut oil	Mayonnaise, creamy salad dressings	Butter, lard, bacon fat, coconut oil, palm oil, cocoa butter/chocolate

Source: HeartPoint Food Pyramid, Http://www.heartpoint.com/Cholfoodpyramid.html
COPY;1997 HeartPoint Updated September 1997

A review of meats

Meats are an excellent food source. Protein is an important part of our diet, but the fat in meats can really add up. Below are a few examples of how much fat is in a 6 ounce serving.

Meat	Fat Grams	Cholesterol Mg
BEEF		
Filet, broiled	16	150
Pot roast, braised	18	180
PORK		
Tenderloin, roasted	8	160
Pork chop, broiled	18	160
POULTRY		
Chicken breast, meat only	6	140
Chicken breast, meat and skin	14	150
FISH		
Cod, baked	2	100
Shrimp, steamed	4	320
Tuna, canned in water	4	60
Halibut, broiled	4	60
Salmon, grilled	14	100

Source: HeartPoint Food Pyramid, Http://www.heartpoint.com/Cholfoodpyramid.html
COPY;1997 HeartPoint Updated September 1997

TOBACCO USE

Smoking is one of the greatest, but most preventable, risk factors associated with CVD, CHD, and stroke. While the number of smokers has decreased in the past three decades, approximately 26% of males and 22% of females over the age of 18 in the U.S. still smoke [3]. Smoking puts one at risk because the nicotine and carbon monoxide in tobacco smoke inhibits the amount oxygen in the blood and damages blood vessel walls making them more susceptible to plaque build-up [6]. Researchers have also found that smoking increases the size of blood clots (thrombus), thus increasing the risk of a "major" as opposed to a "minor" heart attack [12]. Additionally, smoking reduces the amount of HDL or "good" cholesterol in the blood [6]. Tobacco use, especially when other risk factors are present (e.g., diabetes, high blood pressure, high blood cholesterol), greatly increases the risk of coronary heart disease and cardiovascular disease [13]. From 1990-1994, nearly 91,000 men and almost 58,000 women died from smoking-attributable cardiovascular disease [14]. Each year, smoking costs Americans approximately $130 billion in medical care and services [3].

PHYSICAL INACTIVITY

Physical inactivity, or lack of exercise, increases the risk for CVD, especially when combined with a diet high in fat and cholesterol [6]. Regular exercise aids in decreasing the amount of cholesterol in the blood, lowering blood pressure, reducing excess weight by burning calories, and enables diabetics to better control their glucose levels. Bijnen, Caspersen, et al. (1998) found that even elderly persons could decrease their risk of CVD by as much as 30% simply by increasing their physical activity [15]. Remember, any activity is good whether it is jogging, walking, hunting, or caring for animals. The U.S. Surgeon General recommends at least 30 minutes of moderate activity per day, or 10 minutes/3 times per day.

NUTRITION

Healthy eating plays an important role in the prevention of heart disease and stroke. The AHA Eating Plan, combined with physical activity, can lower your risk of high blood pressure, high blood cholesterol, and obesity — all risk factors for heart disease and stroke. The guidelines include the following:

Healthy Eating Pattern

- Consume 5 to 9 servings of fruits and vegetables per day
- Consume 6 servings of whole grains per day (include whole grains)
- Choose low-fat meat & dairy
- Consume 2 servings of fish every week

Healthy Weight

- Balance calories with activity
- Avoid excess calories
- Limit high-calorie and low-nutrient foods

Healthy Blood Pressure

- Limit salt to 6 grams per day (1 teaspoon table salt)
- Limit alcohol consumption

Healthy Cholesterol

- Limit cholesterol intake to 300 mg per day (200 mg if at risk)
- Limit foods high in saturated fat
- Limit trans fatty acids
- Substitute whole grains and unsaturated fats for high fat foods

The AHA guidelines recommend two weekly servings of fish such as mackerel, salmon, lake trout, herring, and albacore tuna. These fish are high in omega-3 fatty acids. Omega-3 fatty acids may help to lower your risk of heart attacks by preventing blood platelets from sticking or clotting to artery walls.

The AHA also recommends reducing your intake of trans fatty acids. Trans fatty acids can be found in processed foods such as doughnuts, chips, crackers, cookies, and snack foods. Additionally, increasing the consumption of legumes and other high fiber foods may also decrease one's risk of CHD [16,17].

The AHA guidelines also provide separate recommendations for those with risk factors for heart disease, including high blood pressure, high blood cholesterol, diabetes, congestive heart failure, kidney disease, and obesity.

Having a family history of heart disease increases a person's risk...

OBESITY

People with excess body weight, especially around the waist area, are at increased risk of high blood pressure, high blood cholesterol, heart disease, stroke, and diabetes [6]. For example, the risk of hypertension is two times higher and the risk of diabetes is three times higher in moderately obese middle-aged men than in their non-obese counterparts [18].

Reducing excess body fat, even as little as 5-10%, can reduce blood pressure and cholesterol levels. Andersen et al. (1999) found that a program consisting of diet and physical activity was as effective as structured aerobic exercise at reducing triglyceride and total cholesterol levels [19]. The body mass index (BMI) is a good way to determine if you are overweight or obese (see Table 5).

TABLE 5: Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks

Weight Classification	BMI (kg/m²)	Obesity Class	Disease Risk* by Waist Circumference	
			Men 102 cm (40 in) or less Women 88 cm (35 in) or less	Men > 102 cm (40 in) Women > 88 cm (35 in)
Underweight	< 18.5		-	-
Normal	18.5 - 24.9		-	-
Overweight	25.0 - 29.9		Increased	High
Obesity	30.0 - 34.9	I	High	Very High
	35.0 - 39.9	II	Very High	Very High
Extreme Obesity	40.0 +	III	Extremely High	Extremely High

= Risk for Type 2 Diabetes, hypertension, and CVD relative to normal weight and waist circumference.
http://www.caloriecontrol.org/bmi.html
Copyright © 2002 Calorie Control Council
Source: National Heart, Lung and Blood Institute

ALCOHOL CONSUMPTION

Some recent studies [20-22] have found that moderate alcohol consumption (no more than 2 drinks/day for men and 1 drink/day for women) can lower a person's risk of heart disease and stroke. Research suggests that the components of alcohol (especially red wine) such as antioxidants and flavonoids can provide some cardiovascular benefits. Some of these components can also be found in other foods, such as grapes and grape juice [1]. Additionally, moderate alcohol consumption can also increase the level of HDL (good) cholesterol. However, excessive alcohol consumption or binge drinking can increase the risk for heart attack and stroke by increasing blood pressure [6].

DIABETES

Diabetes mellitus is a metabolic disease that disrupts the ability of the body to breakdown and process glucose, a form of sugar that is the body's main source of energy. This inability to effectively process glucose leads to a myriad of complications including cardiovascular disease, blindness, and kidney disease. CVD is a major complication and the leading cause of premature death among people with diabetes—at least 65 percent of people with diabetes die from heart disease or stroke [4]. Adults with diabetes are two to four times more likely to have heart disease or suffer a stroke than people without diabetes. Middle-aged people with type 2 diabetes have the same high risk for heart attack as people without diabetes who already have had a heart attack [13]. Relatively small improvements in blood glucose (sugar), lipids, and blood pressure values result in decreased risk for diabetes complications.

OTHER RISK FACTORS OF CARDIOVASCULAR DISEASE

Some risk factors cannot be controlled, but should be taken into account when determining a person's risk of heart disease.

- **Gender** - Men are at greater risk than women, simply because of their gender. (However, this risk disparity diminishes as individuals age.)
- **Age** - As people get older, they are at greater risk for heart disease and stroke.
- **Ethnicity** - African-Americans are at greater risk than Caucasians because of their predisposition to high blood pressure.
- **Family history** - Having a family history of heart disease increases a person's risk of developing the disease themselves.

Warning Signs

HEART ATTACK

While many people think they would know if they were having a heart attack, approximately 40% of the 1.1 million heart attacks in the U. S. end in death each year [23]. Additionally, not all heart attacks are like the ones we see in movies, someone grabbing their chest and collapsing. Many heart attacks start slowly and with mild pain [23]. Table 6 shows the signs and symptoms of a heart attack. If you or someone you know is experiencing any of these symptoms, call 9-1-1 immediately.

STROKE

Likewise, some people may not know the warning signs of stroke so they may wait to call an ambulance or go to a hospital (see Table 6). Recent medical advances associated with treatment of stroke, particularly blood thinning or "clot-busting" drugs (e.g., t-PA), have increased the chances of a person surviving a stroke and reducing brain damage if the treatment is received in time [24]. These treatments are time-dependent, meaning a person must receive the drug or treatment no more than 3 hours after symptoms begin [25]. Therefore, everyone should be familiar with the warning signs noted in Table 6.

TABLE 6 – WARNING SIGNS

WARNING SIGNS	
Heart Attack	**Stroke**
Chest pain or tightness that lasts for more than a few minutes	Sudden numbness or weakness of the face, arm or leg, especially on one side of the body
Pain in upper extremities such as one or both arms, neck, jaw, back, stomach	Sudden confusion, trouble speaking or understanding
Shortness of breath	Sudden trouble seeing in one or both eyes
Profuse sweating	Sudden trouble walking, dizziness, loss of balance or coordination
Nausea, or lightheadedness	Sudden, severe headache with no known cause

Source: AHA website, Heart & Stroke Encyclopedia
http://www.americanheart.org/

MORTALITY

Cardiovascular disease (CVD) has been the leading cause of death in the U.S. every year since 1900, with the exception of 1918 [2,3]. In 1999 alone, 958,755 people in the U.S. died from CVD (1 out of every 2.5 deaths) [1]. While CVD is more likely to strike older individuals, 150,000 of the deaths in 2000 were people under the age of 65 [1]. Even though the death rates from CVD declined 17.0% from 1990 to 2000, the actual number of deaths increased by 2.5% [1].

Coronary heart disease (CHD), which causes heart attacks and angina, is the single leading cause of death in America, accounting for over 681,000 deaths in 2000 [1]. An estimated 1.1 million Americans will have a new or recurrent coronary attack this year, and approximately 450,000 deaths will result from these attacks [1]. Approximately 250,000 people will die suddenly from ventricular fibrillation associated with CHD this year without having been hospitalized [3].

Stroke is the third leading cause of death in the U.S., behind total cardiovascular disease and cancer, and has killed 167,661 people in 2000 [3]. "On average, someone in the U.S. suffers a stroke every 45 seconds; every 3.1 minutes someone dies of one." (pp. 15-16) [3]. Chances are about 1 in 20 that a person will have a stroke by the time they are 70 years old, yet 28% of strokes occur in individuals under the age of 65 [3].

FIGURE 2: LEADING CAUSES OF DEATH–U.S. 1999
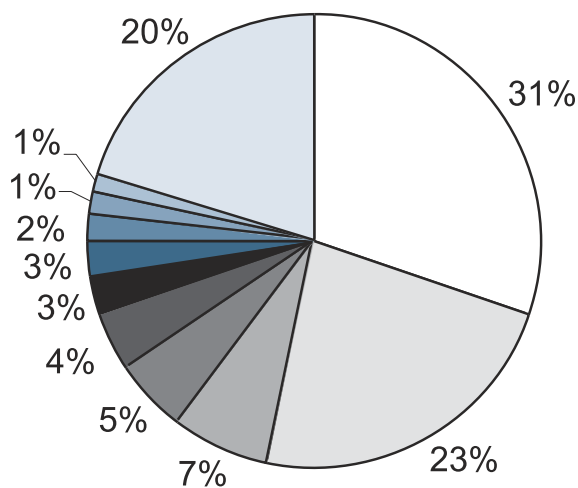
- ☐ Cardiovascular Disease
- ☐ Malignant Neoplasms
- ☐ Cerebrovascular Disease
- ☐ Chronic Lower Respiratory
- ☐ Accidents
- ☐ Diabetes Mellitus
- ☐ Influenza & Pneumonia
- ☐ Alzheimer's Disease
- ☐ Nephritis, Nephrotic Syndrome
- ☐ Septicemia
- ☐ All other causes

Source: National Vital Statistics Report

FIGURE 3: LEADING CAUSES OF DEATH–WY 2000
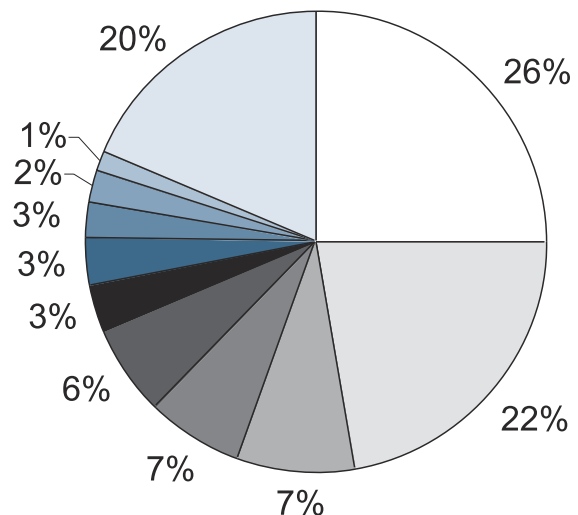
- ☐ Cardiovascular Disease
- ☐ Malignant Neoplasms
- ☐ Chronic Lower Respiratory Disease
- ☐ Cerebrovascular Disease
- ☐ Accidents
- ☐ Diabetes Mellitus
- ☐ Influenza & Pneumonia
- ☐ Alzheimer's Disease
- ☐ Suicide
- ☐ Chronic Liver Disease
- ☐ All other causes

Source: Wyoming Vital Statistics, 2000

MORBIDITY

As with other diseases, not everyone who experiences a heart attack or stroke dies. The AHA estimates that over 6 million people in the U.S. suffer from angina (chest pain caused by coronary heart disease), and more than 4.7 million people have survived a stroke. Stroke is the leading cause of serious, long-term disability in the U.S. [1]. Additionally, the CDC estimates that approximately 50 million Americans suffer from high blood pressure, a major risk factor in CVD, CHD, and stroke [4]. Finally, some 40,000 babies are born each year with some sort of congenital cardiovascular defect, and some 1,000,000 people in the U.S. have some sort of cardiac defect [1].

COSTS

The cost of treating people with CVD, CHD, and stroke is enormous. The AHA estimates the total cost of CVD in 2002 will be $329.2 billion [1]. This cost includes the "direct" costs of treating people with CVD (e.g., physician and hospital costs, medication) as well as the "indirect" costs associated with surviving a heart attack or stroke (e.g., lost productivity, rehabilitation). The total costs of CHD alone will total $214.0 billion, with stroke costing an additional $49.4 billion and hypertensive diseases costing $47.2 billion.

Wyoming

POPULATION

According to the 2001 U.S. Census, the total estimated population of Wyoming was 494,423 making it the least populated state in the United States. Only the cities of Cheyenne and Casper were officially designated as metropolitan communities. Wyoming is a very rural state with over 47% of its counties being designated as frontier [26]. Wyoming's population is estimated to rise to over 690,000 by the year 2025 [26].

The median age for Wyoming residents in 2000 was 36.2 years, which is up from 35.7 in 1998 and 32.0 in 1990. Nearly 21% of Wyoming residents are over the age of 55, and 11.7% are over the age of 65 [26]. As with most other states, the population of Wyoming is aging and subsequently at increased risk for CVD and related conditions. It is estimated that the 65 and over population in Wyoming will increase 99% by the year 2020 [27].

GENDER

Overall, the number of males and females in the state are nearly equal with 49.7% females and 50.3% males [27]. For adults age 18 and over, the split was also very even with 36.9% male and 37.0% female. There were slightly more females (6.5%) than males (5.1%) who were age 65 and older.
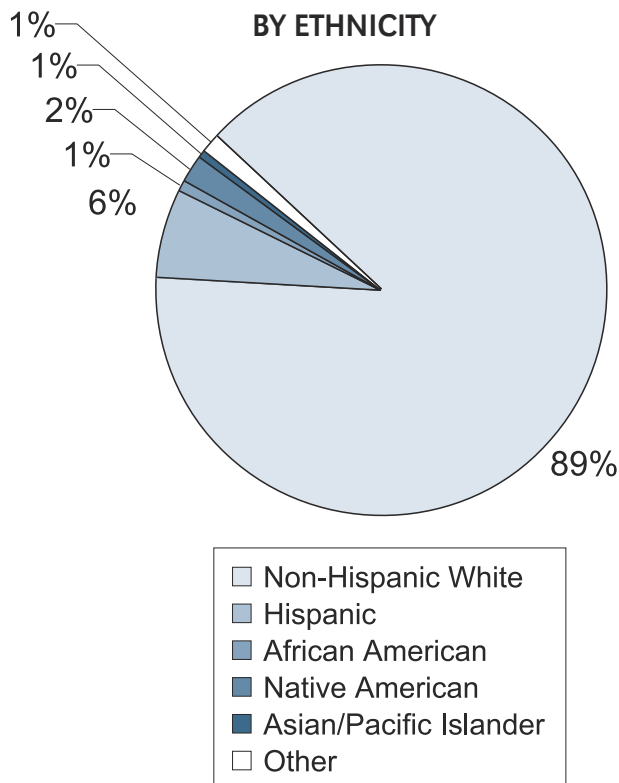
ETHNICITY

Wyoming has a very homogenous population with White (Non-Hispanic) as the predominate race; however, the Hispanic and Latino population has grown and continues to grow (see Figure 4).

EDUCATION

In terms of education, 87.9% of Wyoming residents 25 and older have a high-school diploma and 21.9% hold a Bachelor's degree or higher [26]. The median household income in 2000 was $37,892, which is up from previous years (i.e., 1989 = $32,216) [27]. Eight percent of families in Wyoming were classified as living below the national poverty level in the year 2000, while 8.4 % of the population made $100,000 or more [27] (see Figure 5).

FIGURE 4: 2000 WYOMING POPULATION BY ETHNICITY

1%
1%
2%
1%
6%
89%

Non-Hispanic White
Hispanic
African American
Native American
Asian/Pacific Islander
Other

Source: Wyoming Department of Health/ Chronic Disease Section, 2003

LEVEL OF EDUCATION

FIGURE 5: EDUCATIONAL ATTAINMENT—AGE 25 OR OLDER

Less than 9th grade	9-12, no diploma	High school graduate	Some college, no degree	Associate degree	Bachelors degree	Graduate/ Professional degree
10614	27703	97779	85184	25221	47066	22096
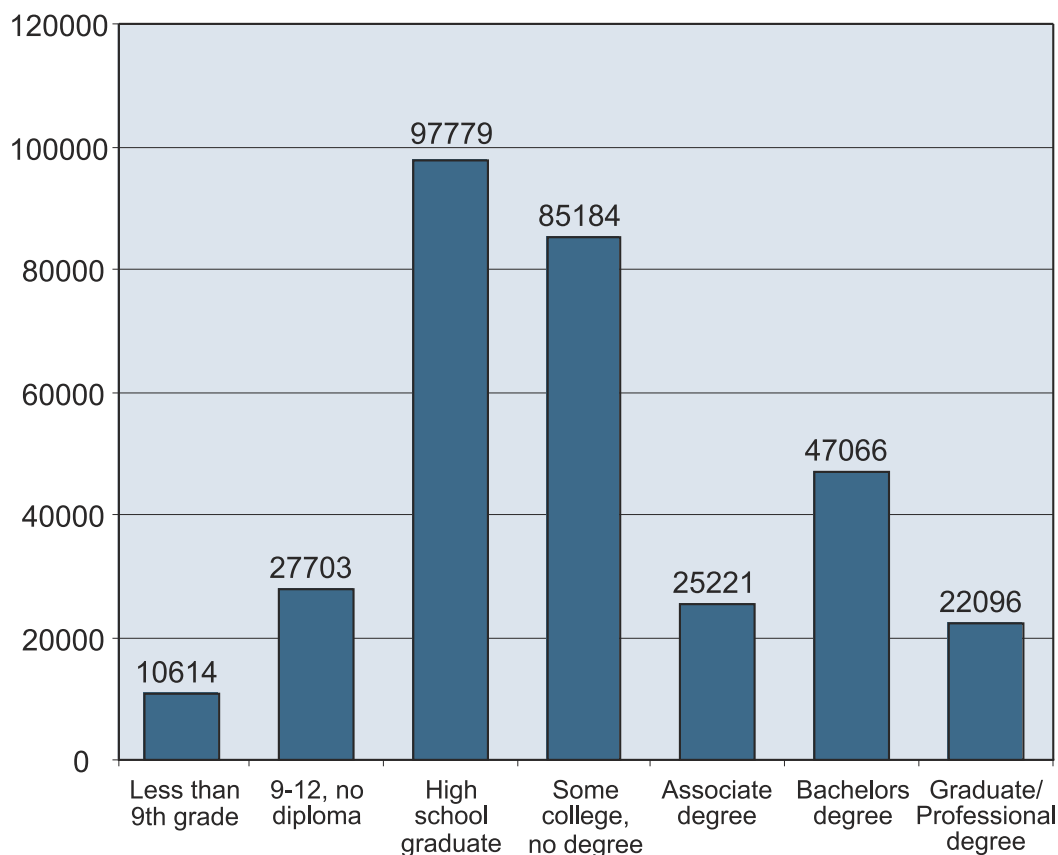
Source: Wyoming Department of Health/Chronic Disease Section, 2003

Cardiovascular Disease in Wyoming

MORTALITY.

As with the U.S. as a whole, cardiovascular disease is the number one killer of Wyoming residents accounting for 33% of all deaths in 2000. CHD was the single greatest cause of death accounting for 26% of all deaths in 2000 (see Figure 3). The age-adjusted (U.S. 2000 population standard) mortality rate for heart disease (ischemic, hypertension, and other) in Wyoming in the year 2000 was 242.38/100,000. Due to the small population in Wyoming, county data was examined by combining data from 1996-2000 for a 5-year age-adjusted rate. Examining this 5-year mortality data by county revealed some interesting results (see Figure 6). The highest rates seem to be clustered around the south and center of the state (Carbon, Platte, Natrona, Fremont Counties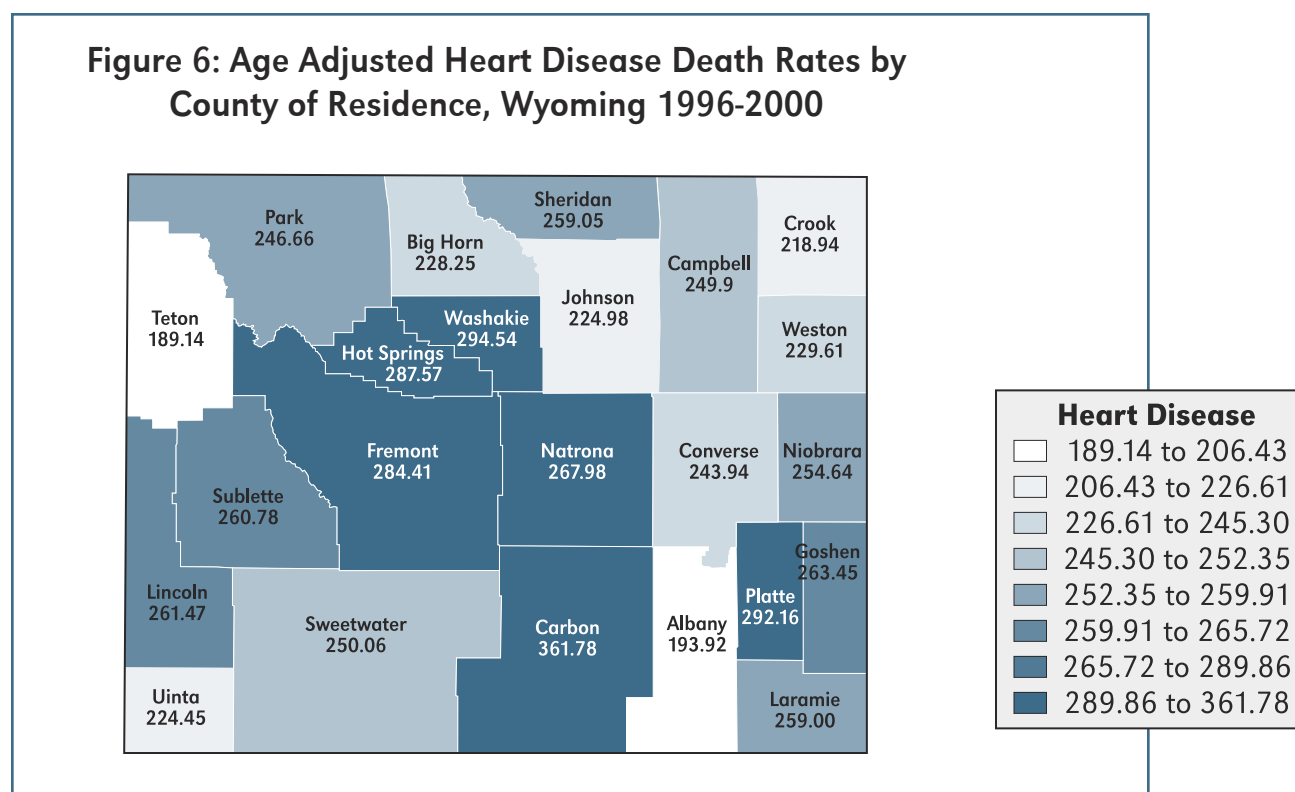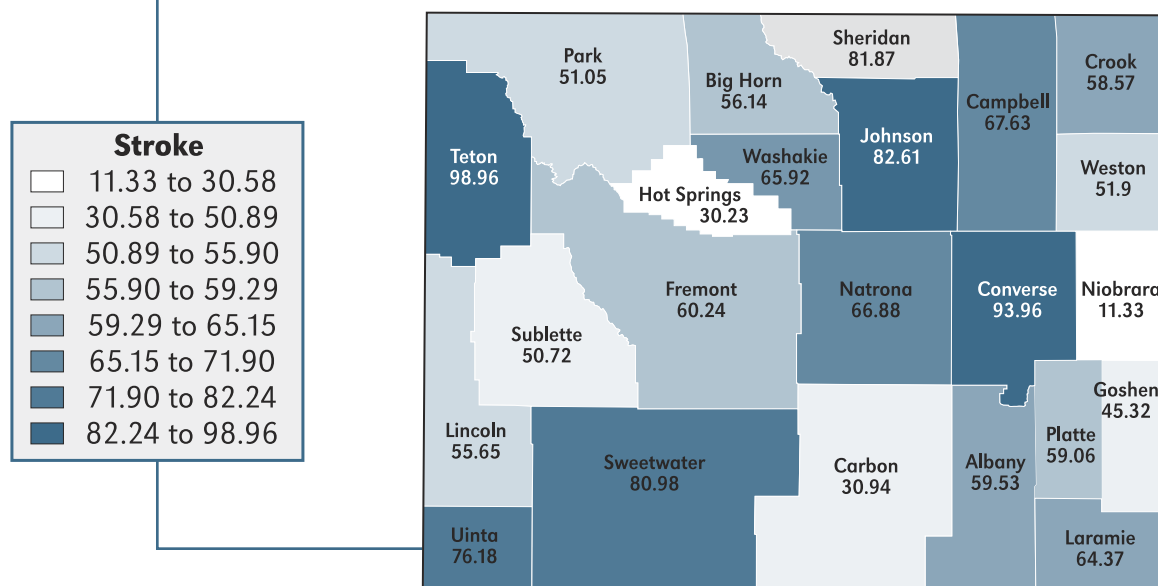, etc.) with Carbon County having the highest age-adjusted rate (361.78/100,000) and Teton County having the lowest (189.14/100,000).

Figure 6: Age Adjusted Heart Disease Death Rates by County of Residence, Wyoming 1996-2000

Heart Disease legend:
- 189.14 to 206.43
- 206.43 to 226.61
- 226.61 to 245.30
- 245.30 to 252.35
- 252.35 to 259.91
- 259.91 to 265.72
- 265.72 to 289.86
- 289.86 to 361.78

Source: Wyoming Department of Health/Chronic Disease Section, 2003

The age-adjusted mortality rate for stroke for Wyoming in the year 2000 was 59.69/100,000. Again, county data for stroke was combined from 1996 to 2000. The five-year age-adjusted mortality rates for stroke appear to be more random with Teton (98.96/100,00) and Converse (93.96/100,000) Counties having the highest rates and Hot Springs (30.23/100,000) and Carbon (30.94/100,000) Counties having the lowest rates. The rate in Niobrara County (11.33) is a statistical artifact because of low numbers and should not be considered reliable (see Figure 7).

Figure 7: Age Adjusted Stroke Death Rates by County of Residence, Wyoming 1996-2000

Stroke
- 11.33 to 30.58
- 30.58 to 50.89
- 50.89 to 55.90
- 55.90 to 59.29
- 59.29 to 65.15
- 65.15 to 71.90
- 71.90 to 82.24
- 82.24 to 98.96

Park 51.05
Sheridan 81.87
Crook 58.57
Big Horn 56.14
Campbell 67.63
Teton 98.96
Washakie 65.92
Johnson 82.61
Weston 51.9
Hot Springs 30.23
Fremont 60.24
Natrona 66.88
Converse 93.96
Niobrara 11.33
Sublette 50.72
Goshen 45.32
Lincoln 55.65
Platte 59.06
Sweetwater 80.98
Carbon 30.94
Albany 59.53
Uinta 76.18
Laramie 64.37

Prevalence Data

Source: Wyoming Department of Health/ Chronic Disease Section, 2003

HOSPITAL DISCHARGES

From July 2000 to June 2001, a total of 6,326 people were discharged from Wyoming hospitals after being admitted for a specific CVD related condition (primary diagnosis) (see Table 8). The average length stay for these individuals was 4.12 days at an average cost of $15,101 per individual, for a $95,527,062 total. When individuals who were admitted to a hospital for some other condition, but also diagnosed with a CVD related conditions (secondary diagnosis) are taken into account, the cost total rises considerably. For both primary plus secondary diagnosis, there were a total of 18,783 discharges over the same time period with an average length of stay of 4.75 days at a cost of $13,121 per individual, for a total of $246,451,360. While CVD and related diagnoses accounted for only 35% of the total number of diagnoses (primary + secondary), the cost of CVD and related diagnoses accounted for 54% of the total cost of all hospital discharges (see Table 9).

TABLE 8: HOSPITAL DISCHARGES - PRIMARY

Hospital Discharges For CVD (Primary Discharge Diagnosis), Wyoming, 7/00-6/01					
Condition (ICD-9-CM Code)	Number of Discharges	Total Length of Stay (days)	Average Length of Stay (days)	Total Charges	Average Charge Per Discharge
All Discharges	49,494	181,638	3.67	$441,439,083	$8,919
Cardiovascular Disease (390-448.99)	6,326	26,078	4.12	$95,527,062	$15,101
Atrial fibrillation (427.31)	460	1,291	2.81	$3,054,126	$6,639
Cerebrovasc. Disease (430-438.99)	958	4,582	4.78	$10,822,228	$11,297
Congestive Heart Failure (428.0)	977	4,658	4.77	$8,632,751	$8,836
Ischemic Heart Disease (410-414.99)	2,454	8,545	3.48	$49,686,690	$20,247

Note: No data from the following county hospitals: Johnson or Star Valley. All diseases/conditions are tabulated on the basis of the primary discharge diagnosis with the exception of "E" code conditions. This table tabulates hospitalizations, not patients. Patients hospitalized twice in the same year for the same condition are counted twice. Hospitalizations of Wyoming residents in out-of-state facilities are not included. Hospitalizations of non-Wyoming residents in Wyoming hospitals are included. VA hospitals, other long-term or specialty hospitals, and critical access centers are not included. ER visits and outpatient visits are also not included.
Source: Wyoming Department of Health/Chronic Disease Section, 2003

TABLE 9: HOSPITAL DISCHARGES – PRIMARY & SECONDARY

Hospital Discharges For CVD (Primary or Secondary Discharge Diagnosis) Wyoming, July 2000–June 2001					
Condition (ICD-9-CM Code)	Number of Discharges	Total Length of Stay (days)	Average Length of Stay (days)	Total Charges	Average Charge Per Discharge
All Discharges	49,494	181,638	3.67	$441,439,083	$8,919
Cardiovascular Disease (390-448.99)	18,783	89,278	4.75	$246,451,360	$13,121
Atrial fibrillation (427.31)	2,995	17,691	5.91	$48,753,153	$16,278
Cerebrovasc. Disease (430-438.99)	2,003	11,213	5.60	$26,700,837	$13,330
Congestive Heart Failure (428.0)	4,451	25,849	5.81	$59,783,811	$13,432
Ischemic Heart Disease (410-414.99)	7,174	32,003	4.46	$108,734,848	$15,157

Note: No data from the following county hospitals: Johnson or Star Valley. All diseases/conditions are tabulated on the basis of the primary discharge diagnosis or any of 24 possible secondary discharge diagnoses on the discharge record. This table tabulates hospitalizations, not patients. Patients hospitalized twice in the same year for the same condition are counted twice. Hospitalizations of Wyoming residents in out-of-state facilities are not included. Hospitalizations of non-Wyoming residents in Wyoming hospitals are included. VA hospitals, other long-term or specialty hospitals, and critical access centers are not included. ER visits and outpatient visits are also not included.
Source: Wyoming Department of Health/Chronic Disease Section, 2003

BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM SURVEY (BRFSS)

Data concerning the prevalence of cardiovascular disease, including coronary heart disease and stroke, in Wyoming comes from the Wyoming Behavioral Risk Factor Surveillance System (BRFSS) for 2001. The BRFSS is an on-going annual telephone survey conducted by the Centers for Disease Control and Prevention (CDC) that provides public health decision makers with information concerning specific individual behaviors as well as information about access to health care.

A total of 3,039 adults in Wyoming were interviewed for the 2001 BRFSS. Each adult was asked a series of core questions regarding their behaviors and attitudes towards several health related conditions (e.g., diabetes, cancer, physical activity). Many of these behaviors are directly linked to CVD risk. Additionally, respondents were asked specific questions related to their behaviors, knowledge, and attitudes towards heart disease and stroke (heart disease and stroke module, 2001).

BRFSS Core Questions

PERCEIVED PHYSICAL HEALTH

Overall, 88.1% of those surveyed indicated they thought they were in good to excellent health. Gender did not make a difference in this perception as both female (87.8) and male (88.6) respondents both thought they were in generally good health (see Table 10).

TABLE 10: HEALTH PERCEPTIONS

General Health Perception				
	Excellent	Very Good	Good	Fair
Male	23.8%	34.6%	31.1%	8.1%
Female	22.5%	35.7%	30.5%	8.5%

Note: Denominator excludes Don't Know/Refused/Missing responses
Source: WY BRFSS, 2001

HEALTH CONDITIONS

Respondents were asked if a physician or other health professional had ever told them they had high blood pressure, high blood cholesterol, or diabetes; all risk factors for CVD. There were no significant differences between men and women for any of the conditions (see Table 11).

TABLE 11: TOLD BY HEALTH PROFESSIONAL

Have you ever been told by a doctor, nurse, or health professional that you have...		
	Male	Female
High blood pressure?	23.2%	21.7%
High blood cholesterol?	31.2%	29.9%
Diabetes?	4.1%	4.8%

Note: Denominator excludes Don't Know/Refused/Missing responses
Source: WY BRFSS, 2001

- Overall, 22.4% of respondents indicated they had been told they have high blood pressure, with slightly more males than females having high blood pressure.

- Just over 30% reported being told they have high blood cholesterol. Again, slightly more males than females reported having high blood cholesterol.

- A total of 4.5% of respondents were informed they have diabetes (this does not include women who were pregnant), with slightly more females than males having diabetes.

CHOLESTEROL TESTED

Respondents were asked if, in the last five years, they had their cholesterol checked. Overall, 72.6% said they had their cholesterol checked within the last five years. Fewer than four percent said it had been longer than five years, and 23.9% said they had never had their cholesterol checked (see Table 12).

TABLE 12: CHOLESTEROL CHECK WITHIN LAST 5 YEARS

Have you had your cholesterol tested in the last 5 years?		
	Male	Female
Within last five years*	68.7%	76.4%
Over five years ago	3.7%	3.4%
Never*	27.5%	20.2%

* = Significant difference (p < .05) between male and female respondents
Note: Denominator excludes Don't Know/Refused/Missing responses
Source: WY BRFSS, 2001

OBESITY

Respondents were asked their height and weight (without shoes), which was used to calculate a BMI score for each individual. A full 36% of respondents were classified as overweight and nearly 20% were classified as being obese. A significantly greater percentage of men than women were classified as being overweight. There were no significant differences between men and women for obesity (see Table 13).

TABLE 13: WEIGHT (BMI)

Weight-BMI		
	Male	Female
Underweight*	0.9%	2.7%
Recommended Weight*	35.5%	49.7%
Overweight*	43.5%	28.3%
Obese	20.1%	19.2%

= Significant difference (p < .05) between male and female respondents
Note: Denominator excludes Don't Know/Refused/Missing responses
-Body mass index is computed as weight in kilograms divided by height in meters squared:(kg/ m2).
-Underweight=BMI2 less than 18.5
*-Recommended Range=BMI2 18.5 to 24.9*
-Overweight=BMI2 25.0 to 29.9
-Obese=BMI2 greater than 29.9.
-BMI2 is an intermediate variable used in calculating these measures.
Source: WY BRFSS, 2001

ACCESS TO HEALTHCARE

Lack of affordable health insurance and the ability to seek care when needed are two of the obstacles facing Wyoming residents today. Since most of Wyoming is rural/frontier, the access to cardiac programs is limited. In fact, there are only 23 pulmonary and cardiac rehabilitation programs to service the entire state (see Figure 8). Of those residents who reported having either a heart attack or stroke, only 31.4% reported going through a rehabilitation program after they were discharged from the hospital.

Figure 8: Wyoming Cardiac and Pulmonary Programs
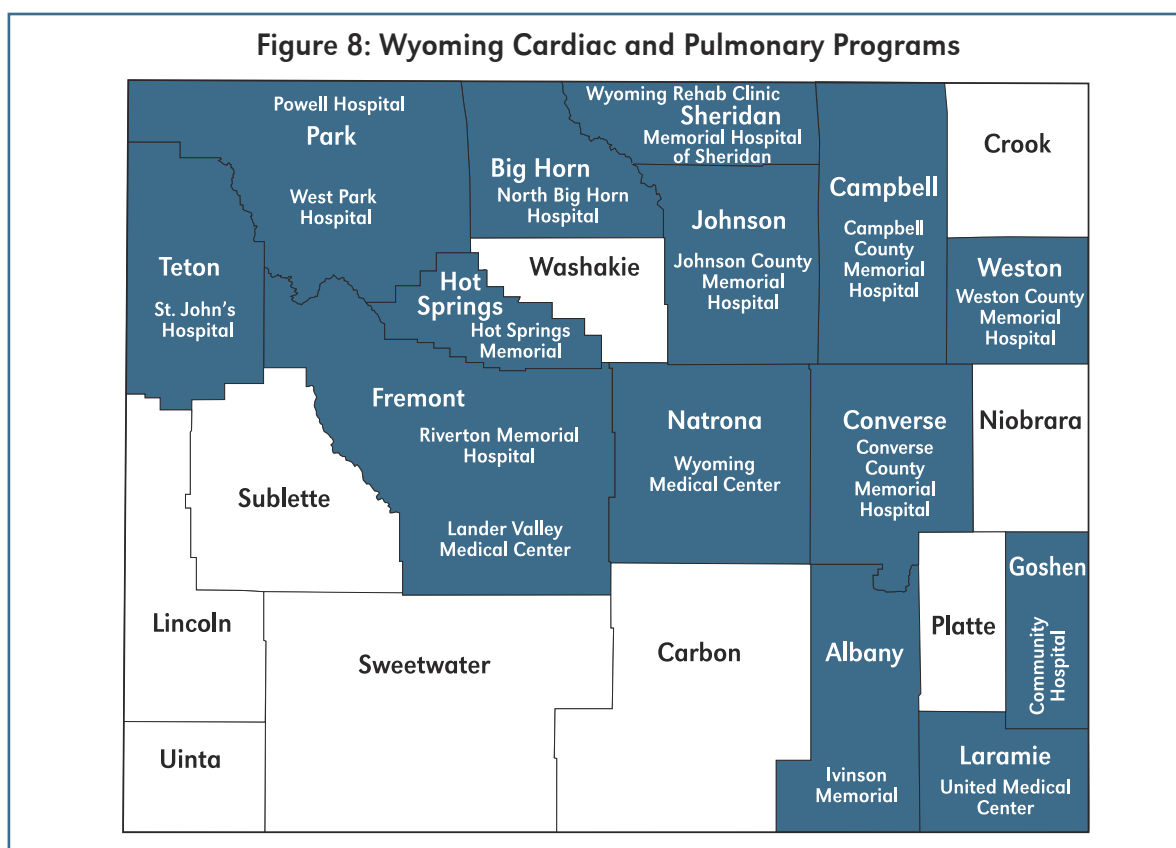
Source: Wyoming Department of Health/Chronic Disease Section, 2003

When asked about their healthcare coverage, 16.7% of Wyoming residents indicated they had no coverage at all. Nearly eight percent of those surveyed claimed they lacked health insurance at some point in the preceding 12 months. Finally, 25.6% said they did not have one person they thought of as their personal doctor or healthcare provider. More men (33.2%) than women (18.2%) indicated they did not have a personal doctor or healthcare provider (see Table 14).

TABLE 14: ACCESS TO HEALTHCARE

Access to Healthcare				
	YES		NO	
	Male	Female	Male	Female
Do you have any kind of healthcare coverage?	83.5%	83.1%	16.5%	16.9%
Any time in last 12 months you did not have health coverage?	7.5%	7.7%	92.5%	92.3%
Do you have (at least) one person you think of as your personal doctor?	66.8%	81.8%	33.2%	18.2%

Note: Denominator excludes Don't Know/Refused/Missing responses
Source: WY BRFSS, 2001

TOBACCO

Overall, 22.2% of those surveyed in Wyoming indicated they were current smokers, with men (22.5%) only slightly ahead of women (21.8%). There were significantly more males who were former smokers, but significantly more females had never smoked (see Table 15).

TABLE 15: SMOKING STATUS

Do you now smoke cigarettes every day, some days, or not at all?		
	Male	Female
Current Smoker	22.5%	21.8%
Former Smoker *	29.0%	23.0%
Never Smoked *	48.5%	55.1%

* = Significant difference (p <0.05) between male and female respondents
Note: Denominator does not include Unknown/Refused/Missing responses
Source: WY BRFSS, 2001

ALCOHOL CONSUMPTION

Respondents were asked to indicate how much and how often they drink alcohol. Binge drinking was defined as consuming five or more drinks on one or more occasions in the past 30 days. Overall, 16.0% of respondents were at risk for binge drinking. Significantly more males were classified as being at risk of binge drinking than females (see Table 16). To

TABLE 16: BINGE DRINKING

Risk of Binge Drinking		
	Male	Female
At-risk for binge drinking *	23.7%	8.4%
Not at risk	76.3%	91.6%

Binge drinking is defined as five or more drinks on one or more occasions in the past 30 days.
* = Significant difference (p <0.05) between male and female respondents
Note: Denominator does not include Unknown/Refused/Missing responses
Source: WY BRFSS, 2001

assess heavy drinking, men were asked if they consumed 2 or more drinks per day, and women were asked if they consumed 1 or more drinks per day. Almost 7% of men and 3.8% of women were classified as being at risk for heavy drinking.

PHYSICAL ACTIVITY

Respondents were asked if they participated in any leisure time physical activity or exercise. Overall, 21.2% of those surveyed indicated they engage in no leisure time physical activity. The percentage of men and women who participated in any or moderate physical activities was similar. However, significantly more men than women indicated they regularly engaged in some form of vigorous activity (see Table 17).

TABLE 17: PHYSICAL ACTIVITY

Physical Activity		
	Male	Female
No physical activity	20.4%	22.1%
Some physical activity	79.6%	77.9%
Moderate physical activity	56.8%	55.0%
Vigorous physical activity*	34.9%	26.0%

* = Significant difference (p <0.05) between male and female respondents
Note: Denominator does not include Unknown/Refused/Missing responses
Source: WY BRFSS, 2001

BRFSS Cardiovascular Disease Module

SYMPTOMS OF A HEART ATTACK

Respondents were asked six (Yes/No) questions concerning the signs and symptoms of a heart attack. One of the six heart attack questions actually described a symptom of stroke (trouble seeing), and a respondent had to answer "NO" to this question to be correct.

Overall, a vast majority (88% - 96%) of respondents were able to correctly identify chest pain, pain in the arms or shoulders, and shortness of breath as signs of a heart attack. Slightly fewer respondents (55%-69%) correctly identified pain in the jaw, neck or back, and feeling lightheaded as symptoms of a heart attack (see Table 18). Roughly one-third of the respondents correctly identified the decoy question concerning stroke symptoms.

Two of the six questions showed a significant difference between males and females. More females than males knew that pain in the jaw, neck, or back were symptoms of heart attack. Likewise, more females than males knew that pain in the arms or shoulders were signs of a possible heart attack.

Additional analyses were conducted to determine the number of individuals who correctly answered four, five, or six questions. Only 10.5% of respondents answered all six questions concerning heart attack symptoms correctly. Just over 50% correctly answered five of the six questions correctly and slightly more than 80% answered at least four of the six questions correctly.

TABLE 18: HEART ATTACK SYMPTOMS

Knowledge of Heart Attack Symptoms (N = 3039)						
	YES		NO		DON'T KNOW	
	M	F	M	F	M	F
Pain in Jaw, Neck or Back*	50.1%	59.0%	26.6%	17.8%	23.2%	23.2%
Feeling Weak, Lightheaded	68.1%	69.5%	15.5%	12.0%	16.4%	18.6%
Chest Pain or Discomfort	95.5%	96.3%	2.5%	2.3%	1.9%	1.3%
Pain in Arms or Shoulders*	88.5%	93.7%	6.1%	3.6%	5.4%	2.6%
Shortness of Breath	87.2%	89.5%	5.5%	5.2%	7.3%	5.4%
Trouble Seeing*	31.6%	36.0%	32.9%	29.5%	35.5%	34.4%

* = Significant difference (p <0.05) between male and female respondents
Note: Denominator does not include refused responses
Source: WY BRFSS, 2001

SYMPTOMS OF STROKE

Respondents were also asked six (Yes/No) questions related to the signs and symptoms of stroke. Again, one of the six questions actually described a symptom of a heart attack (chest pain) instead of a stroke and should have received a "NO" answer from respondents to be correct.

A sizable number (87%-93%) of respondents were able to correctly identify three symptoms of a stroke: sudden confusion/trouble speaking; sudden numbness in face, leg or arm; and sudden trouble walking, dizziness or loss of balance (see Table 19). Fewer knew that sudden trouble seeing or sudden headaches with no known cause were also symptoms of a possible stroke.

Three of the six questions showed significant differences between male and female respondents; and in each case, significantly more females than males answered the question correctly. Specifically, more females than males knew that sudden confusion or trouble speaking, sudden trouble seeing, and severe headaches with no known cause were signs of a stroke. There was no difference between men and women for the decoy question about chest pain.

Almost 20% of respondents correctly answered all six questions concerning stroke symptoms. Nearly 55% were able to answer at least five questions correctly, and 75.8% correctly identified at least four of the six symptoms.

TABLE 19: STROKE SYMPTOMS

Knowledge of Stroke Symptoms (N = 3039)						
	YES		NO		DON'T KNOW	
	M	F	M	F	M	F
Sudden Confusion, or Trouble Speaking*	84.5%	90.6%	3.3%	2.2%	12.2%	7.2%
Sudden Numbness in Face, Arm or Leg	92.2%	94.1%	2.6%	1.7%	5.6%	4.2%
Sudden Trouble Seeing*	63.4%	69.7%	8.1%	4.9%	28.5%	25.4%
Sudden Trouble Walking, Dizziness, Loss of Balance	86.1%	88.4%	3.5%	2.5%	10.3%	9.1%
Severe Headache w/ No Cause*	57.9%	62.8%	12.3%	9.1%	29.8%	28.1%
Sudden Chest Pain or Discomfort	34.2%	31.7%	38.3%	35.3%	27.4%	32.9%

* = Significant difference (p <0.05) between male and female respondents
Note: Denominator does not include refused responses
Source: WY BRFSS, 2001

Finally, all respondents were asked, "If you thought someone was having a heart attack or stroke, what is the first thing you would do?" Overall, 84.7% said they would first call 9-1-1, 9.1% said they would take the person to the hospital, and 4.1% indicated they would do something else. Significantly more females (85.7%) than males (81.3%) said that they would first telephone the 9-1-1 emergency system.

LOWERING RISK

All respondents were asked three questions concerning their attempts to lower their risk of heart disease and stroke. They were asked, "To lower your risk of developing heart disease or stroke are you…" a) eating fewer high fat, high cholesterol foods; b) eating more fruits and vegetables; and c) being more physically active? Significantly more women indicated they were eating fewer high fat/cholesterol foods and more fruits and vegetables than their male counterparts (see Table 20).

TABLE 20: REDUCING RISK - SELF

To Lower Your Risk of Developing Heart Disease or Stroke are you… (N = 3039)				
	YES		NO	
	M	F	M	F
Eating fewer high fat, or high cholesterol foods?*	60.4%	70.5%	39.8%	29.6%
Eating more fruits and vegetables?*	71.5%	83.5%	28.5%	16.5%
More physically active?	70.8%	70.6%	29.3%	29.4%

= Significant difference (p <0.05) between male and female respondents
Note: Denominator does not include unknown/refused responses
Source: WY BRFSS, 2001

Additionally, respondents were asked, "Within the past 12 months, has a doctor, nurse, or health professional told you to…" a) eat fewer high fat/cholesterol foods; b) eat more fruits and vegetables; c) be more physically active? Significantly more women reported being told to eat more fruits and vegetables and to be more physically active (see Table 21).

TABLE 21: TOLD TO…

Within the last 12 months has a doctor, nurse, or other health professional told you to… (N = 3039)				
	YES		NO	
	M	F	M	F
Eat fewer high fat, or high cholesterol foods?	15.5%	17.2%	84.5%	82.8%
Eat more fruits and vegetables?*	21.4%	27.5%	78.6%	72.5%
Be more physically active?*	24.1%	28.0%	75.9%	72.0%

= Significant difference (p <0.05) between male and female respondents
Note: Denominator does not include unknown/refused responses
Source: WY BRFSS, 2001

ASPIRIN THERAPY

Those who were 35 years of age and older were asked about their use of aspirin. Respondents were first asked if they took aspirin daily or every other day, and if they had any health conditions that would make taking aspirin unsafe? Significantly more men reported taking an aspirin daily or every other day than women. However, significantly more women reported having a health problem or condition that made taking aspirin unsafe (see Table 22).

TABLE 22: ASPRIN THERAPY

Aspirin Therapy- Adults age 35 and older				
	YES		NO	
	M	F	M	F
Do you take aspirin daily or every other day?* (n = 2257)	35.0%	23.6%	65.0%	76.4%
Do you have a health problem or condition that makes taking aspirin unsafe?* † (n = 1607)	9.6%	20.6%	90.4%	79.4%

* = Significant difference (p <0.05) between male and female respondents
†=Asked only of those individuals who reported not taking a daily aspirin
Note: Denominator does not include unknown/refused responses
Source: WY BRFSS, 2001

Those people that reported taking an aspirin daily or every other day were asked why they took the aspirin: a) to relieve pain, b) to prevent heart attack, or c) to prevent stroke. Significantly more women indicated they took aspiring to relieve pain, but significantly more men said they took aspiring to prevent a heart attack (see Table 23).

TABLE 23: REASON FOR TAKING ASPIRIN

Why do you take aspirin? (N = 650) †				
	YES		NO	
	M	F	M	F
To relieve pain*	28.0%	36.0%	72.0%	64.0%
To prevent heart attack*	77.9%	70.9%	22.1%	29.1%
To prevent stroke	67.3%	63.4%	32.8%	36.6%

* = Significant difference (p <0.05) between male and female respondents
† = This question asked only of those who reported taking daily aspirin
Note: Denominator does not include unknown/refused responses
Source: WY BRFSS, 2001

Wyoming's Cardiovascular Disease Control Program

"WHERE HEART HEALTH HAPPENS"

OVERVIEW:

The Cardiovascular Disease (CVD) Program works to prevent, detect, and monitor cardiovascular disease within Wyoming. The CVD Program provides cardiovascular disease health promotion and disease prevention programs to communities as well as health care providers. The CVD Program focuses on primary prevention where related risk factors including physical activity, nutrition (5 A Day), elevated blood pressure, and elevated blood cholesterol are addressed.

SERVICES:

Cardiovascular Health Grants

The CVD Program provides funding to assist communities in developing and implementing cardiovascular health promotion and disease prevention programs.

Resources & Materials

Videos, books, brochures, and other materials relating to CVD can be checked out for health fairs, community heart health programs, or seminars. The program also assembles heart-healthy educational kits throughout the year.

PROGRAMS:

STATEWIDE

Wyoming 5 A Day Program

The Wyoming 5 A Day Program is part of a nationwide nutrition campaign encouraging Americans to eat 5 or more servings of fruits and vegetables daily for better health. The program is sponsored by the National Cancer Institute and the Produce for Better Health Foundation. Research has shown that eating 5 fruits and vegetables daily reduces the risk of cancer, heart disease, and other illnesses.

Wyoming Walks Program

The CVD Program partnered with the Governor's Council on Physical Fitness & Sports and the YMCA to develop and implement a community-wide walking program. Wyoming Walks is a 12-week walking program designed to help people of all ages become more physically active. The program is absolutely FREE and targets all age groups. Participants receive a walking manual, log book, and incentives throughout the 12-week program. The program allows participants to begin anytime and walk individually or as a team.

CVD Coalition

The CVD Coalition serves as a resource to assist and facilitate state and community level partnerships to improve the cardiovascular health of all Wyoming residents. The CVD Coalition was formed in the year 2000 to serve as an advisory group to the Wyoming Department of Health's Cardiovascular Disease Program. The CVD Coalition is comprised of various state agencies, professional and voluntary groups, community organizations, and interested volunteers.

Cardiovascular Coalition Members

American Heart Association

Campbell County Memorial Hospital

Dr. Jack Glode

Governor's Council on Physical Fitness & Sports

Dr. James Harper

Curt Kaiser

Mountain-Pacific Quality Health Foundation

Dr. Eric Munoz

Natrona County School District

Pfizer Pharmaceutical, Inc.

Dr. A. Louis Steplock

Wyoming Department of Education

Wyoming Department of Health

Wyoming Department of Transportation

United Medical Center

University of Wyoming

Western Dairy Council

Wyoming Medical Center

Wyoming Health Resource Network

Wyoming Primary Care Association

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